

Serial No. 09/658,732

March 8, 2004

Reply to the Office Action dated June 11, 2003

and the Advisory Action dated December 2, 2003

Page 6 of 9

### REMARKS/ARGUMENTS

Claims 1-10 and 12-15 are pending in this Application.

Claims 1-10 and 12-15 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Sawada et al. in view of Enoki et al. Applicants respectfully traverse the rejection of claims 1-10 and 12-15.

Claim 1 recites:

"A field-effect semiconductor device comprising:  
a channel layer;  
a contact layer;  
**a semiconductor structure having an electron-affinity different from those of the channel layer and the contact layer and formed between the channel layer and the contact layer, the semiconductor structure having a first junction face between the semiconductor structure and the channel layer and having a second junction face between the semiconductor structure and the contact layer;**  
an ohmic electrode formed on the contact layer; and  
a Schottky electrode formed on the semiconductor structure;  
**wherein both of the first junction face and the second junction face are iso-type heterojunctions; and**  
the semiconductor structure is composed of a single material and includes at least two semiconductor layers." (Emphasis added)

Claim 15 recites:

"A field-effect semiconductor device comprising:  
a channel layer;  
a contact layer;  
**a semiconductor structure having an electron-affinity different from those of the channel layer and the contact layer, the semiconductor structure having at least two layers;**  
an ohmic electrode formed on the contact layer; and  
a Schottky electrode formed on the semiconductor structure;  
wherein  
**the semiconductor structure is formed between the channel layer and the contact layer, and where a junction between said layers of the semiconductor device is a heterojunction, the junction is an iso-type heterojunction.**" (Emphasis added)

Serial No. 09/658,732

March 8, 2004

Reply to the Office Action dated June 11, 2003

and the Advisory Action dated December 2, 2003

Page 7 of 9

Applicants agree with the Examiner that Sawada et al. does not anticipate the claims. The Examiner has relied upon Enoki et al. to allegedly cure various deficiencies in Sawada et al.

First, in paragraph no. 3 on page 4 of the Advisory Action the Examiner concluded, "Enoki [et al.]'s teaching of the effect that is produced by inserting the undoped layer between the two  $[4 \times 10^{18}]$  doped layers, would suggest that the effect would similarly result when inserted in the Sawada [et al.] device because that is also doped to the same order of  $10^{18}$ ." However, the Examiner has failed to provide any evidence to support this conclusion.

The Examiner is reminded that prior art rejections must be based on evidence. Graham v. John Deere Co., 383 U.S. 117 (1966). The Examiner is hereby requested to cite a reference in support of his conclusion that one of ordinary skill in the art would have expected that the result achieved in Enoki et al. with a doping layer with more than twice the doping of the doping layer of Sawada et al. could be achieved in the doping layer of Sawada et al. If this conclusion is based on facts within the personal knowledge of the Examiner, the conclusion should be supported as specifically as possible and the rejection must be supported by an affidavit from the Examiner, which would be subject to contradiction or explanation by affidavit of Applicants or other persons. See 37 C.F.R. § 1.104(d)(2).

Second, in paragraph no. 4 on page 5 of the Advisory Action the Examiner alleged, "Enoki was relied upon for its broader teaching that within a FET of given material system, the doped-barrier layer thereof may be further provided with an undoped region for influencing the Schottky barrier height ..." The Examiner has indicated that he is relying upon the first paragraph of Enoki et al. under the section "II. Device Structures and Performances" to support this allegation. This portion of Enoki et al. discloses, "[t]he doping density for  $n^+$ -InAlAs was  $4 \times 10^{18} \text{ cm}^{-3}$ . The undoped InAlAs layer between two highly doped InAlAs layers is to enhance the Schottky

Serial No. 09/658,732

March 8, 2004

Reply to the Office Action dated June 11, 2003

and the Advisory Action dated December 2, 2003

Page 8 of 9

barrier of the gate metal" (emphasis added). The Examiner has completely failed to explain how this specific teaching of Enoki et al. that an undoped layer of InAlAs between two doped layers of n+-InAlAs with doping density of  $4 \times 10^{-18} \text{ cm}^{-3}$  reduces the Schottky barrier of the gate metal supports the general allegation that any undoped layer between any two doped layers having any doping density reduces the Schottky barrier of the gate metal.

Third, assuming *arguendo* that Enoki et al. teaches the Examiner's general allegation discussed above, the Examiner has failed to consider how modifying the device of Sawada et al. to include an undoped layer will affect the operation of the device. As discussed in the paragraph bridging pages 4 and 5 of the originally filed Specification, undoped layers located between doped layers increase the resistance of the device. The Examiner is reminded that if the proposed modification would render the prior art invention being modified unsatisfactory for its intended purpose, then there is no suggestion or motivation to make the proposed modification. In re Gordon, 733 F.2d 900, 221 USPQ 1125 (Fed. Cir. 1984) and MPEP § 2143.01. Thus, it would not have been obvious to modify the device of Sawada et al. to include an undoped barrier layer between two doped barrier layers because it would result in a device having an unsatisfactorily high resistance.

Accordingly, Applicants respectfully request reconsideration and withdrawal of the rejection of claims 1 and 15 under 35 U.S.C. § 103(a) as being unpatentable over Sawada et al. in view of Enoki et al.

Accordingly, Applicants respectfully submit that Sawada et al. and Enoki et al., applied alone or in combination, fail to teach or suggest the unique combination and arrangement of elements recited in claims 1 and 15 of the present application. Claims 2-10 and 12-14 depend upon claim 1 and are therefore allowable for at least the reasons that claim 1 is allowable.

In view of the foregoing remarks, Applicants respectfully submit that this

Serial No. 09/658,732

March 8, 2004

Reply to the Office Action dated June 11, 2003  
and the Advisory Action dated December 2, 2003

Page 9 of 9

application is in condition for allowance. Favorable consideration and prompt allowance are solicited.

To the extent necessary, Applicants petition the Commissioner for a ONE-month extension of time, extending to March 9, 2004, the period for response to the Office Action dated June 11, 2003 and the Advisory Action dated December 2, 2003.

The Commissioner is authorized to charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 50-1353.

Respectfully submitted,

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